under the presidency of Professor R. J. Johnstone, professor of gynecology in Queen's University.

THE Oberly Memorial Prize will be awarded this year in the sum of $100 for the best bibliography submitted in the field of agriculture and related sciences. Four copies of each bibliography entered should, before March 31, be in the hands of the chairman of the Oberly Memorial Fund Committee, Gilbert H. Doane, director of University Libraries at the University of Wisconsin.

*Industrial and Engineering Chemistry* reports that the president of the American Welding Society has announced acceptance by the Board of Directors of a gold medal to be known as the Lincoln Gold Medal and to be presented to the author of the best paper on any phase of welding published in the *Journal of the American Welding Society* during the year October, 1936, to October, 1937. The donor of the medal is J. F. Lincoln, president of the Lincoln Electric Company, who makes this contribution as a stimulus to the preparation of worth-while contributions on the art of welding. Further information can be obtained from the society at 33 West 39th Street, New York N. Y.

THE Secretary of State for Scotland announces that the office of regius professor of chemistry in the University of Glasgow will become vacant on October 1, 1937, owing to the resignation of Professor G. G. Henderson, and that it is proposed to take steps with a view to the filling of the vacancy. Applications, accompanied by two copies of recent testimonials, should be addressed to the Private Secretary, Scottish Office, Whitehall, London, S.W.1, and should reach him not later than April 30.

PLANS are being prepared for an entire new group of buildings for the College of Engineering at Cornell University. The trustees have appropriated $5,000 for this purpose and have designated R. Harold Shreve, '02, of Shreve, Lamb, and Harmon, New York City, as architect. A detailed study of the present status and future needs of the college has been under way for some time and will be continued.

*Industrial and Engineering Chemistry* reports that the Bausch and Lomb Optical Company has opened a new laboratory for applied research in order to enter upon a broad program of fundamental investigations on the chemistry and physics of glass surfaces and on the development of new materials and processes for the industry. Frank P. Kolb is chief chemist, and Theodore J. Zak, assistant chemist. A series of laboratory units are devoted to research in the fields of metallurgy, experimental electroplating, spectroscopy, photomicrography and physical testing. One of the most interesting units is that in which James E. Wilson and his assistant, Vernon Patterson, are engaged in applying metallurgical equipment to the study of the structure of the steels and alloys used in industry. The testing and control laboratory, directed by Ray A. Kirchmaier and Joseph T. Anderson, is equipped for general analytical work. D. M. Webb has been added to the staff for research in chemistry, one of his immediate problems being the electrodeposition of various metallic substances as a backing for reflectors.

# DISCUSSION

## FOSSIL CYCAD NATIONAL MONUMENT

WHAT this monument (as set aside by act of Congress in 1922) means in the series of national monuments and to botanical science needs to be simply told, though clearly the remarkable flowering cycadeoids which give the monument its feature can never be fully told about in words alone. They need *in situ* exhibition. That's the reason for the monument. Thus far the great collections from the monument have received much attention in many and sumptuously illustrated scientific contributions. The more primary scientific values involved have had wide notice the world over in both paleontologic and botanic texts. Yet that splendid landscape so replete with geographic and evolutionary values has had but meager illustration. Moreover, exactly within the past ten years six distinct lines of study and research have greatly enhanced the monument values.

*Firstly,* the cycadeoids of the Beskids of the Carpathians have been given that exacter illustration which shows them to be related to some of the Black Hills types, close as are perhaps European to American oaks, the same being true of the cycadeoids of the Apennines, the Isle of Wight and the Isle of Portland. That is, we have here to deal with types of uncommon beauty and very wide distribution in both latitude and time. If the display at the monument is brought into and rigidly kept in a real unity it will always have a deep interest to the foreign visitor.

*Secondly,* there is now in view a fine addition of types from the Trinity Beds of Texas, as noted in SCIENCE. These are conveniently grouped as five new species, but so closely resemble the several Black Hills types as to suggest a mere southern outlier of the monument forest.

*Thirdly,* while the geologic age of the monument

types is Lakotan or very low Cretaceous, if not Jurassic, high up in the Upper Cretaceous or Mesaverde of New Mexico and Arizona there are now found to occur in a striking alignment three species of those free-flowering relatives with fruiting in all the frond base axillae. Such types have been for some time known to be of wide distribution ranging back to the close of the Jura, though hitherto exceedingly rare in collections. While closely related to Cycadeoidea, the free-flowering species (eight in all) are now set in a new genus *Monanthesia,* as named from the strong tendency to monocarpy or a single season flowering or anthesis. The Mesaverde species are *Monanthesia magnifica, M. blanca* and *M. equalis,* as already illustrated. That this general type extends back into the Jura and may be old is highly significant. The finest representative thus far discovered is the *Monanthesia* (Cycadeoidea) *Dartoni* from the Como or closing Jura of the Black Hills, taken as an equivalent of the Wealden of the Isle of Wight. This is not only one of the most remarkable of all ancient completely petrified plants, but one of the most elaborately studied and illustrated.

*Fourthly,* renewed attention to the petrified stems from the Isle of Portland shows them to be far more instructive than appeared during all early cutting as done without the aid of etching over larger surfaces. Of singular interest is what may be seen in the complete tangent armor sections of the *Cycadeoidea microphylla* of Buckland. From these sections it is found that what looks like a heavy globular to flat stem is merely a lesser, even slender stem bearing a mass of large bract-enveloped branches. The initial foliage fronds are few and small or little above scale leaves, while the bracts of the floral axes may bear small pinules proving the complete transition. The peduncular axes are really sizable branches. They emerge freely below the crown and reach large size. The main stem, though at first taken as simply columnar, may just as well be called ex-current with profuse branching. Measurements are here most instructive. A stem 25 cm in height with a woody cylinder only 8 cm in diameter and a thin cortical region bears an "armor" mass of small frond bases and many large bract invested peduncles or branches 15 cm in depth. The reproductive branches make up by far the greater bulk.

*Fifthly,* on the Fossil Cycad National Monument Mesa for the first time a serious quarrying operation was carried out with the aid of CCC help in November, 1935, bringing to light one ton of *in situ* specimens. Uneroded, unbroken, of varied specific type, nothing approaching such a collection has ever been seen before in the course of the even hundred years during which the cycadeoids have been better known as fossils. Rightly displayed in the field museum planned for the monument, this material alone will afford a singularly fine exhibit. There is a wealth of lesser leafed, branched and more generalized columnar types so highly instructive in tracing relationships and in proving how these plants, as fantastic as the cushion vegetation of the tropics or high mountains, may yet be traced through to their small-stemmed relatives of the Trias with a branching habitus like that of the magnolia.

Two types the botanist may do well to think of here are the branched *Williamsonia Dyeri* of the Trinity beds of Texas and a related long-known Jurassic species of the Paris Museum called *Clathropodium sarlatense.* The latter might be called *Cycadeoidea,* but is in no small degree an intermediate between that genus and *Williamsonia.* The heavy woody cylinder and relatively small medulla come near to more average gymnospermous woody stems. Small-leafed monument species like the *Cycadeoidea protea, C. minima* and *C. nana* also finely illustrate the transition.

*Sixthly.* The investigation of the marvelous petrified *Araucarian* forest of the Cerro Cuadrado, of north Central Patagonia, together with most important European studies, has led to a much broadened view of the floral morphology in the gymnosperms. Now at last it is seen how the cycadeoids, as seed fern derivatives, are far more nearly related to both the Cordaites and the conifers than was earlier even conceivable. In fact, the cycadeoids in their structural elements, both vegetative and floral, may be taken as left-overs from very ancient, even pre-Cordaites times. They show that the greater lines of seed plants were very much related to each other in their beginnings and that botanists must yet face the severe alternative of an all seed fern *vs.* all Lepidophyte origin for all the post-Paleozoic forest canopies. It's one or the other, with only a very minor chance that both great lines have shared in the long upward course. The more reasonable view is that the horsetails and club mosses of to-day are all that is left of the vegetation that in *Lepidostrobus* of Paleozoic times nearly reached the seed stage.

Here too must be mentioned the very instructive demonstration of the embryos of the Cerro Cuadrado Araucarians as brought out in the December, 1936, *Botanical Gazette* by Bertha Schweitzer Darrow. Mrs. Darrow shows that the two-cotyledon embryos of these older forms are typically Araucarian in feature. Thus is emphasized again the fact that the generalized embryo of the Araucarian is little different from that of the far older cycadeoids, however primitive polycotyledony and polyembryony may be. We are set visibly nearer some understanding of primitive embryonic factors and structures.

From the foregoing brief review it is seen that the cycadeoids of the Fossil Cycad National Monument are fundamentally important in botanical science. Furthermore, nowhere else so far have the specialized and heavy-stemmed branched types been found. Nor has a display of such gemstone beauty ever been brought together anywhere else on the globe.

Regarding the field conditions at the monument it merely remains to add that the location is a most sightly one and very accessible. At a moderate expense it can because of accessibility and surroundings be brought into a remarkable beauty of landscape, where the students may study at first hand in nature's own primitive setting the facts of the past, "the evidence that has never been tampered with by the hand of man," as Andrew Carnegie said. Furthermore, in addition to the plethora of material already had there is the sure promise of far more beneath the front mesa. The horizon is perfectly defined and traced around the monument borders. There are small shifts, slips or faults cutting these rim strata at various angles. But such have also tended to protect considerable material from loss by erosion. The cycadeoid level extends under fully three fourths of the entire monument area, while the trend of occurrence for the finest of the petrified stems indicates the presence within easy reach on the main mesa-capping of new material in excess of all ever recovered so far. One of the most splendid of all specimens, one of the most remarkable for beauty of silicification is the type *Cycadeoidea superba* which I secured absolutely *in situ* on the mesa cap at a point free from fault or shift for a long distance. Only shallow quarrying must reveal more such great specimens.

Fossil Cycad Monument more than all others of its series is as we now see dependent on an absolutely *in situ* development and display. Without this it can mean but little, as a mere blurred shadow, all but lost again in the shuffle of time. With it come into view a panoramic beauty, educational values of the highest and all that fuller realization of those far-away landscapes of dinosaur times, without some understanding of which we may scarce expect to learn or know life and ourselves.

What may the future wish and what do we owe? Shall we ourselves never develop the greater schools combining both exactitude and the open spaces? A recent summary shows that at the largest woman's college in the North (Hunter College of the City of New York) fully half the students preferred courses in some form of art. Here is time and here is nature in their highest expression. It is the artistic, trained sense that must best comprehend.

Just now, too, six students of the Yale Art School have in competition presented fully drawn-out plans for the monument field museum. All are of interest and merit. All show once and for all that the place for the monument display is on the monument itself and that there alone may a primary display be set to full advantage, there being as little reason for failure or going elsewhere as there would be for monumenting Gettysburg on other hills than where the historic action was fought.

The proposed Fossil Cycad National Monument development, as now quite definitely planned, will cost $65,000 initially. The question as to whence this money should firstly come was partly answered by the late Senator Norbeck, of South Dakota, who took the trouble to draft in preliminary form a bill providing for the planned development which he unqualifiedly favored. The plans, too, had the commendation of Mrs. Anna Wilmarth Ickes, who wrote the fine book "Mesa Land."

Meanwhile the visitor to the Black Hills is warned that without this development he can at present see next to nothing aside from fine "Rim" scenery at the monument, unless he is an extremely well-read and trained geologist. Above all, he need not go there, as many have done, expecting to quickly find and take away valuable specimens. Except for some mere accidental fragment meaningless to the layman, nothing is to be seen at the surface fulfilling the untrained conception of petrified forests.

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## BUILT-UP FILMS OF PROTEINS AND THEIR PROPERTIES

RECENTLY, Irving Langmuir, V. J. Schaefer and D. M. Wrinch[1] published in this journal experiments in which protein monolayers were deposited on chromium-plated slides, which were covered with several layers of barium stearate. By this procedure it was possible to build up several layers of protein films, which, depending on the method used, had either their lyophobic groups ("B" layer) or their lyophilic groups ("A" layer) exposed to the surface. From these experiments the following appear to be noteworthy and apparently open to objections:

(1) The protein layers were built up from films which were spread on distilled water and compressed to a pressure of 30 dynes per cm. (2) Lyophobic B-layers are wetted by water to the same extent as lyophilic A-layers. (3) PRBB layers can be obtained by suitable procedures, whereas it was impossible to build up PRAA layers.

According to Gorter,[2] Hughes and Rideal[3] and to my

[1] SCIENCE, 85: 76, 1937.
[2] *Proc. Acad. Sci. Amsterdam*, 29: 371, 1926.
[3] *Proc. Roy. Soc.*, 137A: 62, 1932.